should be without a chair in the subject which they had raised from dependence on mineralogy to the rank of an independent science. Still more did it astonish me, and the astonishment is unabated, that no one among those who owed money to the discoveries of geology was prepared to spend a penny in the way of gratitude. It was not among the wealthy that Pringle Nichol's genius had kindled the zeal for knowledge.

I carried my plaint to the Science Commission, the first Universities Commission, and finally to the second Commission, created in 1889 to "improve the teaching" in the Universities of Scotland. To all the same tale was told, with increasing earnestness as time went on, and the evils correspondingly increased. It was worse than absurd to expect one man to teach two subjects, either of which was more than any one could follow, even with ample time at his command, so rapid were the advances and so unexpected the specialisations enforced by the discovery of new methods and new fields of inquiry. The medical students were always the more numerous class, and the increasing stringency of the regulations for examinations left me no choice but to devote myself to those whom I had to teach summer and winter. Since 1867 the progress of Geology has been marvellous, Mineralogy has entered on a new phase, Microscopy has assumed an indisputable position as arbiter in problems that never could have been discussed, never perhaps have been raised without its aid. I had no time for the field work, which I had carried on as long as possible. Before the G. A. Clark scholarship was founded I had employed lecturers at my own cost to supplement my class work in Mining and Chemical Geology. Thereafter these graduates did as much as possible when they happened to take special interest in my subject. After many years of disappointment and drudgery, such as, I hope, my successors will be spared, drudgery which has deprived me of the chance, save at rare intervals, of original work, with joy I hailed the new, the present Commission with its instruction to "improve the teaching," for now surely was a Commission about to secure for this University, for Scotland, for science, what Murchison in loyalty to his native country and to his beloved studies had rendered possible for Edinburgh. The Commission is now approaching the end of its sittings, and I am still the "double-barrelled gun" that Murchison called me when I took leave of him on resigning the Survey appointment I had held.

In 1874 Mrs. Honyman Gillespie endowed my chair with £200 a year in respect of Geology, and named me a trustee on her gift, a position I accepted, as it was through an indirect and, let me add, an unwitting suggestion of mine that the benefaction was decided on. My intervention, later on, in the case of the W. Baxter scholarship was direct. It was made a proviso that the Professor of Natural History should not vacate the geological lectureship in the event of a chair of Geology being founded unless an equal stipend were continued to him during his incumbency. It shows how carefully Mrs. Gillespie and her advisers had considered the circumstances, that they thus removed from the incumbent any inducement to delay for personal reasons the separation of the two subjects, which the endowment was implicitly intended to bring about. After the evidence I submitted to the Commission, I was amazed to learn that they contemplated the creation of a new chair, not of Geology, but in a subject new to the Scottish Universities, not compulsory for a degree but optional; nay, it is one of six subjects which the candidate for M.A. may select from, viz. English, French, German, Italian, Spanish, History; a collocation which tempts to the suspicion that the subject of imperative necessity was, after all, an after-thought. Such an addition meant diminution of the fee fund, but this concerned my colleagues interested in the financial consequences. My concern was that a subject which an unreformed university had deemed of sufficient importance to have included twenty years before in the requirements for a degree should be passed over, while the new chair of Pathology was the recognition of an exactly parallel want. No; not exactly, for the pathologist had always had ample opportunities for study and research, undisturbed by the need of teaching even a cognate subject, far less one widely apart from his proper work. Parallel, however, in so far as its relation to a degree, the time this relation had existed and the compulsion of attendance were concerned. In contrast with the position of History, let me tell you the relations of Geology: it is compulsory for the degree of B.Sc. in Agriculture, and the certificate in Engineering Science; it is optional for B.Sc. in Pure Science and Engineering; optional also for M.A. Need I say that it is not to the addition of History I object, but to the circumstances attending the addition. The new subject was made to hang loosely to the University, yet it was at once raised to the rank of a professorship, and the means of endowing Geology finally diverted. It seemed a first duty to provide for the better teaching of a degree subject, and under this impression I addressed a very strong remonstrance to the Commissioners. When the evidence and correspondence are published, the reading will be curious and interesting. The interest would have been discounted if the meetings of the Commission had been public, but there would have been less disappointment if precedent had been departed from. After my protest had been disregarded another source of help was revealed, the Bellahouston Trust. The trustees have acted with great generosity, and would have doubled their benefaction by speed had the matter been solely in their hands. It would be wrong to comment on negotiations still pending after two years, but I may say that the salary demanded by the Commissioners as the condition of their consent to the separation of the subjects is not fully realised; the University has no longer in its power the money, which with the Honyman-Gillespie fund and the Bellahouston gift would have met the requirements of the Commissioners. No doubt a lectureship might be established, and perhaps the legal difficulties might be got over; but this is not what the subject is entitled to, either on its own merits or in respect of the position it has so long held in the University curriculum. Here the matter rests.

I hope to have made it clear to those who have blamed me for remissness that I have done all that I can; that the only wrong thing which has brought me into this impass was my voluntary separation of the two subjects. I was younger and more sanguine then. My colleagues in St. Andrews and Aberdeen are still safe in this respect, and I would advise them to keep as they are; the new chairs will come more rapidly.

I regret that no acknowledgments are due to others besides Sir C. Cameron. The General Council of the University has never mentioned the case of Geology; it would not have helped them to any increase of power. The University Court—I mean that created by the Act—has done what it could to forward the chair; it erred, as I think, only in assenting to the creation of another chair without giving due consideration to the elder degree subject, rather to the degree subject, for the other is only an option. The position of the Commissioners is less easily understood, and in the absence of evidence it is but right to conclude that they had sufficient reason for the course they have taken; what it is will appear in their report. My chief complaint goes back of these; it is directed against the mineral proprietors, who have left till now unfulfilled the duty they owe to science and their city. Had the moderate sum I asked twenty years ago been then contributed, there would have been by this time a well-endowed chair, and Glasgow would have been on a footing of equality with Edinburgh as a school of science. It is painful, by way of contrast, to read of the munificence with which citizens have endowed the Mining School of Chicago, to cite one of the many American colleges where public and private spirit have vied in securing the best training that money and skill can give for their engineers, where the presidents of colleges ask and receive abundantly.

But do not imagine that you will not be taught geology. It is true that you will not learn all that I wish you had opportunity of learning. Not one, but three chairs would really content me; but, on the other hand, you will have your attention directed to aspects of the science which another might pass by. It is the practical side of the teaching on which the deficiency lies. If I cannot make you go through the methods of microscopic investigation as we do in the zoological laboratory, you will hear the conclusions to which microscopists are leading us. You will learn the bearing of biological speculation on geology, the value of fossil evidence from the zoological side, and the direction in which we shall probably have to travel in that most important quest, that geological grail, the estimate of geological time.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Mr. P. E. Bateman, Fellow of Jesus College, has been appointed an Assistant Demonstrator in Experimental Physics at the Cavendish Laboratory.

The Conference on Secondary Education, previously arranged for the Long Vacation, will be held in Cambridge during April next, probably towards the end of the month. A large concourse is expected.

Science states that the late Franklin Baldwin, of North Grafton, Mass., has made the following bequests, to take effect on the death of his wife:—Wellesley College, 50,000 dollars to found a chair in Mathematics in memory of his daughter, Katie Emma Baldwin; Smith College, Northampton, 12,000 dollars for scholarships; the University of Vermont, 10,000 dollars for scholarships; Dartmouth College, 6000 dollars for scholarships. The residue of the estate (some 20,000 dollars) is left to Clark University. It is also stated that Mrs. E. G. Kelly, of Chicago, will erect a chapel, at a cost of 100,000 dollars, for the University of Chicago, as a memorial to her brother.

THE following are among recent appointments abroad:—Dr. C. A. Strong to be Lecturer on Psychology in Columbia College; Prof. L. S. Luther to be President of Kenyon College, Gambier, Ohio; Prof. Theodore von der Goltz to be Professor of Agriculture in the University at Bonn; Dr. Dock to be Professor of Pathology and Bacteriology at Jefferson Medical College, Philadelphia; Prof. W. I. Blake to be Professor of Geology and Mining in the University of Arizona; Dr. Hüfner to be Professor of Physiological Chemistry at Strassburg; Dr. H. Rubens, Privat-docent in Physics in the Physiological Institute at Berlin, to be Extraordinary Professor; Dr. L. Neumann, Extraordinary Professor of Geography at Freiburg, to be Ordinary Professor; Dr. Max Le Blanc to be Extraordinary Professor of Physical Chemistry at Leipzig; H. F. Wiebe and Dr. K. Feussner, of the Charlottenburg Reichsanstalt, to be Professors; Dr. A. Weiss to be Assistant in the Mineralogical Institute of Greifswald University. Among recent nominations are: Dr. Otto Mügge to the chair of Mineralogy at Königsberg; Dr. Klemenčic to be Professor of Physics at Innsbruck.

ONE of the best products of the Technical Education movement is the *Journal* of the Essex Technical Laboratories—a monthly bulletin issued by the Technical Instruction Committee of the Essex County Council. The current number contains short descriptions of tuberculosis in cattle, the influence of various manures on pasture, the pruning of trees, the growth of plants, and other subjects, most of them instructively illustrated. A note at the end of the *Journal* announces that "The resources of the County Technical Laboratories are always at the disposal of correspondents as far as such services do not interfere with the regular work of the classes. Such work as testing germinating power and purity of seeds, identification of grasses, weeds, &c., examination of diseased plants and injurious insects, bacteriological examination of milk, &c., may be cited as the kind of help hitherto rendered to inquirers." By affording such opportunities for the acquisition of knowledge, and by the encouragement to observation and exact work offered in the *Journal*, the Essex Technical Instruction Committee is doing work which will benefit the county and the nation.

A MOVEMENT was started last year to secure greater facilities at the University of Paris for such prolonged study with the acquisition of learned degrees as hitherto has attracted English and American students chiefly to Germany. The *Times* correspondent at Paris now calls attention to the promulgation, a few days ago, of a decree reforming the Licence ès Sciences. Partially owing to the greater liberty permitted in the choice of studies, the possibility of moving from one University to another, and the privilege of being examined when they wish, English and American students have hitherto patronised almost exclusively the German Universities. The new decree will permit France to offer, at least as far as the scientific faculties are concerned, attractions equal or superior to those of Germany. As compared with the old regulations, the important provisions of the new decree are as follows:—First, the principle of election is introduced into the groups of studies chosen by the student; secondly, the student may migrate from one institution to another; and, thirdly, he may pass his examinations as he chooses, either singly or *en bloc*. After taking the Licence, the student may secure the doctor's degree upon presenting a satisfactory dissertation. Under the German system the candidate submits his thesis first and passes his examination afterwards, the doctorate being the only recognition he receives. In France, on the contrary, the student by passing his examination first will secure a certificate for every subject which he takes up, and will receive the Licence when he has completed the whole group, regardless of whether he ever takes the doctorate or not.

THE annual general meeting of the Association of Technical Institutions was held on Friday last. The Right Hon. A. J. Mundella, M.P., was elected president for the year, in succession to Mr. W. Mather. In his presidential address, Mr. Mundella referred to the systems of technical education abroad, and said that England was suffering from her past neglect and from over-confidence. As a consequence of the industrial training which the people of Switzerland had received, that country had exported a greater proportion of manufactured articles per head of her population than any other nation in the world. This he attributed wholly to education, the country being without coal and iron. German manufacturers also had the great advantage of employing a body of highly-disciplined men, who thoroughly understood the technique of their occupation. He held that if this country wished to make further progress in technical education there must be co-operation by employers. Elementary education should also be improved, and children should remain a longer time at school. The Association of Technical Institutions existed for the purpose of developing industrial education, but he warned them against becoming mere grant-earners. In a discussion that followed, upon the new syllabus for practical chemistry, regret was expressed that the Department of Science and Art still requires students in the elementary stages to have had practice in qualitative analysis. The alternative scheme for the award of grants based upon attendances as well as examination was discussed, and several alterations in the conditions of the scheme were suggested. Other subjects which were considered by the Association were the standard of success in the Department's examinations last May, and the Report of the Royal Commission.

SCIENTIFIC SERIALS.

American Meteorological Journal, January.—The audibility of fog-signals, by Prof. H. A. Hazen. The recent grounding of a passenger steamer on Great Gull Island in a dense fog, within five thousand feet due west of a second-class siren which was sounding at the time, calls attention to several points referred to in a paper by the same author in the journal for October last. This siren has been heard to a distance of twenty miles under favourable circumstances; but the captain of another steamer, which approached the island from the west at the time of the accident, states that his look-out was unable to hear any sound as they approached the island, whereas, after passing, the whistle could be plainly heard.—Atmospheric phenomena in the Arctic regions in their relation to dust, by Prof. W. H. Brewer. The author states that none of the fogs in high latitudes are so white and opaque as those seen south of lat. 50°, and that it is rare that they are so opaque that large dark objects cannot be seen at a distance of two hundred feet. In the Greenland seas the fogs were, as a rule, very much wetter. Often when the fog was so transparent that objects could be seen for half a mile or even a mile from the ship, the water would drip like rain from the rigging. On returning to the south, where the fogs were very dense and objects could not be seen at a ship's length, there was a marked contrast in their wetness; the air did not appear as if entirely saturated. The dust particles in the air over the southern waters were ample to collect all the moisture, while in the Greenland fogs condensation went on as if there was not nearly dust enough in the air to supply the demand.

Bulletin de l'Académie Royale de Belgique, Nos. 9–10.—At the request of M. Spée, astronomer at the Royal Belgian Observatory, a sealed packet was opened which had been deposited by him on January 8, 1887, and contained the description of an apparatus to enable astronomers to obtain the spectroscopic conditions of a total solar eclipse for the observation and photography of the corona and prominences. It is best described as a body generated by the revolution of a longitudinal section of a direct-vision spectroscope about its longer side, thus producing a series of cones and cylinders. This body is used for the spectroscopic analysis of a cylindrical beam of light proceeding from the chromosphere, and obtained by means of a circular slit of diameter equal to that of the sun's image suitably inserted in the telescope. The less highly refractive glass may also be replaced by a liquid, thus leading to considerable simplification, or the whole may be replaced by a circular grating. It should be noted that an apparatus very similar to this was described by Mr. C. Zenger in 1893.—Does a net impede the